

Title: Clinical Information Needs of CHCs for HIT (CLINCH-IT)

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STRUCTURED ABSTRACT

Purpose

To identify the unmet information needs of clinical teams delivering care to patients with complex medical, social, and economic needs; and to propose principles for redesigning electronic health records (EHR) to address these needs.

Scope

Little is known about clinical teams' information needs when screening, documenting, and then using information regarding patients' social risks to inform care delivery. Developing a better understanding of these information needs is a prerequisite for design of health information systems.

Methods

Care teams in nine community health centers were observed to understand their use of the EHR when caring for patients with complex medical and socioeconomic needs. A comparative approach was used to identify information needs, which were then used to produce EHR design principles that inform development of a prototype tested with users.

Results

We identified four major categories of information needs related to: consistency of social determinants of health (SDH) documentation; SDH information prioritization and changes to this prioritization; initiation and follow-up of community resource referrals; and timely communication of SDH information. We propose the following EHR design principles to address these needs: enhance the flexibility of EHR documentation workflows; expand the ability to exchange information within teams and between systems; balance innovation and standardization of HIT systems; organize and simplify information displays; and prioritize and reduce information. These principles informed revision of the OCHIN SDH tool set, and development of a prototype for collecting SDH that users suggested performed well.

Key Words: primary health care, community health centers, EHR, SDH

PURPOSE

The purpose of the Clinical Information Needs of Community Health Centers for Health Information Technology (CLINCH-IT) grant was to identify the information needs that must be met to ensure effective care coordination for complex patients in Federally Qualified Health Centers (FQHCs) and Community Health Centers (CHC's) and to rapidly develop and test health IT tools that address these needs. This was accomplished with three specific aims.

Aim 1: Identify CHC clinicians' and clinical teams' information needs when they work individually and collaboratively to coordinate care for complex patients.

Aim 2: Identify CHC clinicians' and clinical teams' information needs regarding patients' social determinants of health, and methods for obtaining this information and integrating it into the EHR so as to inform clinical decision-making when caring for complex patients.

Aim 3: Identify design principles; use proven development methods to rapidly develop and test health IT tools to meet the health IT needs identified in Aims 1 and 2.

SCOPE

We conducted an in-depth observational study to identify the information needs of clinical teams delivering primary care to complex patients. Early in our work, we learned that clinical teams working in community health centers did not separate patients' medical and social and economic needs; instead they defined complex patients as those that had both. Although public health leaders have elevated the importance of recognizing and addressing the deleterious effects of SDH, and recommended that health care teams systematically collect and document patients' social risks, few studies have examined how primary care practices formally or informally collect and use such information when caring for complex patients. As a result, little is known about clinical teams' information needs when screening, documenting, and then using information regarding patients' social risks to inform care delivery, about the extent to which these information needs are being met, nor how information about patients' social and economic need may be used at the point of care to inform clinical practice. This is particularly important to examine since information about patients' SDH may not fit neatly into EHR's discrete data fields. Thus, developing a better understanding of these information needs is a prerequisite for design of biomedical informatics systems, and this was an information gap our study aims to begin addressing.

In this study, we recognized that users' information needs could vary across provider types and care setting; we define information needs as the desire of an individual or team to obtain information to satisfy the requirements of a task or workflow. We focused on care delivered in CHCs because these practices deliver care to underserved and complex patients. Our objective was to understand the use of the EHR by CHC care teams when caring for patients with complex medical and socioeconomic needs and to use the study findings, and to propose principles for redesigning EHRs to address the information needs of those assessing and addressing social risk among complex patient.

In order to address unmet information needs, we worked with the design team at OCHIN to inform the redesign of their current SDH dashboard, and we engaged in a user-centered design process to build a dashboard, that was Epic agnostic, that prioritized and summarized social determinants of health for review by clinical team members. The prototype dashboard that was built incorporated factors such as clinician priority, patient readiness, and referral status, with the screening functionality being based off the core measures of the PRAPARE screening tool. User acceptance testing involved stakeholders in various clinical capacities to capture an overarching view of workflow and involvement in documenting, tracking, and addressing SDH needs. Task areas included documenting social needs, identifying unaddressed needs based on a pre-populated patient dashboard, determining referral status, adjudication of clinical priorities, and reviewing a patient's historical social needs.

METHODS

Study Design

This study design combined mixed methods (i.e., observation, surveys and interviews with clinical team members) to elicit and categorize needs and requirements to inform subsequent technology development processes.[23] Analyses of these data were structured to identify unmet information needs and produce design principles that would address these needs with a focus on clinical teams serving complex patients. The Oregon Health & Science University Institutional Review Board approved this study protocol.

Setting

This study was conducted in the OCHIN practice-based research network. OCHIN is a community-based, non-profit Health Center Controlled Network with over 500 CHCs in 19 states. OCHIN member CHCs primarily serve socioeconomically vulnerable patients, who have a disproportionately high prevalence of co-morbid physical and mental health problems.[24 25] OCHIN members share a single, fully-integrated Epic® EHR that includes practice management data (claims, billing, appointments) and a full medical record. Two of the CHCs (Clinics 5 and 8) were pilot-testing a checklist-based SDH tool at the time of the study.

Sample

We recruited 11 OCHIN CHCs in Oregon and Washington, purposively selected to vary with regard to geographic location (urban, rural, suburban), size of patient population served, and years using the EHR. Agreement to participate in this study was obtained on behalf of each practice. Clinic staff (e.g., office manager, clinician, nurses, etc.) were individually invited to participate in semi-structured interviews and surveys. For interviews, we purposively selected staff with a wide range of roles. Staff were consented via an Information Sheet for the surveys and interviews; the study was granted a waiver of documentation of signed consent.

Data Collection

Data collection was guided by a human factors model called the Systems Engineering Initiative for Patient Safety (SEIPS) 2.0.[26] We used a multi-method rapid assessment approach [27-29] to collect data on the following SEIPS 2.0 components: work systems (identifying existing tools and technology teams used in delivering care to complex patients, who used these tools, and how features of the internal and external context shaped work systems); processes (observing tasks and workflows in which team members engaged to deliver complex care, with attention to the physical, cognitive, and social / behavioral aspects of these tasks; and the immediate

outcomes (desirable, undesirable, proximal, distal) of EHR use related to care delivery to complex patients. To maximize the breadth of our understanding, we observed and asked about care delivery in an open-ended way first (i.e., one that was not directly informed by SEIPS 2.0). Then, we used the SEIPS 2.0 model to inform more specific field observation and probing questions during interviews.

Data were collected iteratively: we conducted a site visit with one CHC and analyzed data in a preliminary manner to inform data collection at subsequent CHCs. This allowed us to monitor for saturation (the point at which no new findings emerged).[30] Data collection started with a pre-site visit planning call to the CHC manager. The manager and/or lead clinician completed a Practice Survey asked about practice size, ownership, and staffing. Site visits were conducted by a team experienced in field research. The size of the team (range: 2-4 field researchers) and length of the site visit (range: 5-7 days) varied depending on practice size. Field researchers typically spent a half day observing the practice and a half day preparing field notes. We used a blend of unstructured and template-driven observation. Template-driven observation was informed by SEIPS 2.0 domains. Site interviews were conducted from October 2015-February 2017. Collectively, we spent approximately 315 hours observing the 9 practices. At completion of the ninth site visit, we determined saturation was reached. This yielded 427 pages of field notes overall.

We conducted a total of 51 interviews with clinical staff and conducted between 4 and 14 interviews at each CHC, depending on practice size and diversity of care team roles. Interviews followed a semi-structured guide, informed by the SEIPS 2.0 framework, that asked respondents about their experiences working with complex patients, how they identified patients' social and economic needs, how they used (or did not use) their EHR to perform tasks related to delivering care for complex patients, and what information needs they identified as unmet with regard to complex care delivery (see Appendix 1). On average, interviews were 45 minutes in length. All interviews were audio-recorded.

Data Management

Notes written on-site were expanded into comprehensive field notes by the researchers, typically within 24 hours of the visit. Interviews were professionally transcribed. All recordings, field notes, transcripts, and digital copies of collected artifacts were catalogued in a spreadsheet and kept on a secure network. Qualitative data were entered into Atlas.ti, a qualitative analysis software program. Practice Survey data was entered into a spreadsheet and then R software 3.4.1[31] was used for analysis.

Data Analysis

Three researchers experienced in qualitative methods, primary care practice organization and care delivery, and EHR use in this setting analyzed qualitative data using an inductive process. This first step in the analysis focused on identifying and documenting high-level work processes and tasks by clinical role, within each CHC. Next, analysts focused on refining our understanding of these work processes and roles from the perspective of SEIPS 2.0. Analytical summaries identified these processes, noted how identifying and addressing social and economic need was part of these processes, and started to identify unmet information needs at a given CHC. Preliminary findings were shared with the larger team, which included informatics experts and designers. Next, we compared data across CHCs to identify similarities and differences. We focused on when and how patient social and economic needs arose in the context of complex care. We also examined how this information was addressed and how the

EHR supported (or did not support) this work. We reached consensus through group dialogue. We did not need to use consistency measures; we resolved differences through discussion.

To distill and summarize findings to inform the design process, we used an iterative discussion and agile approach, using Trello – a card-based organization system – to group findings from the qualitative analysis into categories. Each ‘card’ was created from emerging categories and subcategories with representative quotes, roles, and an explanation. Cards were sorted by subcategory into relevant groups until the analysts came to consensus about the major categories. We linked these groupings to relevant documents, including segments of raw qualitative data and qualitative summaries. From these cards, pairs of investigators developed requirements for each grouped category of information needs. This information was then synthesized through iterative discussions, and finally developed into a refined list of unmet information needs and design principles for EHR systems to support team care for complex patients.

Usability Assessment Tool

User acceptance testing involved stakeholders in various roles, including community health workers (n=3), physicians (n=4), social determinants of health (SDH) and behavioral health supervisors (n=2), non-clinical health professionals (n=4), a community resource specialist (n=1), and a medical assistant (n=1) for a total of 15 individually tested users. The testing protocol captured the user’s current workflow and involvement in documenting, tracking, and addressing SDH needs and guided the user through a variety of clinical tasks that could be completed using the functionalities of the prototype dashboard. Task areas included documenting social needs, identifying unaddressed needs based on a pre-populated patient dashboard, determining referral status, adjudication of clinical priorities, and reviewing a patient’s historical social needs. The usability of the tool was evaluated based on the System Usability Scale (SUS), a standardized Likert survey, and through a semi-structured exit interview.

Limitations

We focused on CHCs because patients served in this setting have a range of social and economic vulnerabilities, making coordinating care for complex patients a common occurrence. However, some of our findings – such as the recognition that social, economic and medical needs are inextricable, and involve a wide range of professionals in patient care – might be unique to CHCs and limit the transferability of our study findings. In addition, we studied practices that all used the same version of a single EHR. Limitations in transferability were offset by the following. First, two OCHIN CHCs were pilot-testing a checklist-based SDH tool, which offered an opportunity for comparison and added learning. Second, developers at OCHIN were actively modifying their SDH tools, giving us the ability to gain a deeper understanding of the functionality of the system, whether or not these functions were used by teams. This deeper learning was considered a critical priority given the lack of prior research on this topic. In addition, while our research identified the need to have functionality that supports clinicians in prioritizing social risk information, we did not try to achieve consensus among clinicians about which social risks should be prioritized. Our qualitative data suggest that practices may set these priorities differently based on their understanding of community need and practice capacity, but more research is needed to see if primary care clinical teams could reach consensus about such priorities. Until then, our design principles suggest that this needs to be adaptable to different community care settings.

RESULTS

Identifying Unmet Information Needs (Aims 1 and 2)

We identified 10 unmet information needs. These unmet needs coalesced into four types relating to how the EHR supported the need for (1) consistency, (2) prioritization and (3) referrals, as well as (4) team communication.

Consistency

When taking care of patients' medical needs, clinical teams needed consistent information about patients' social risks, particularly those that posed relevant barriers to care. Having consistent information on patients' social risks was a challenge for a variety of reasons. Patients were not consistently asked this information by one clinical team member, and – as a result – information about social risk emerged naturally in conversation during visits and often with one or more members of the care team. For example, we observed patients share this information with Medical Assistants (MAs), Care Managers, behavioral health clinicians and social workers, while this information might not be shared with the clinician. In addition, there were inconsistent protocols or workflows for documenting social risk information among the CHCs and at the majority of CHCs there was not a consistent place to document this information in the EHR. Clinical staff members might put social risk information in a note or they might just remember it and not document it. As a result, clinical team members did not find it easy to find social risk information in the EHR, as there was not a consistent place to look for it. When a clinical team member wanted to quickly get a sense of this information, it was a difficult and time-consuming task that might not yield any information.

In addition, when a patient was connected to another team member for assistance with addressing a social and economic need, there was not a clear way to share information about these needs. Two CHCs in our study had a place in the EHR to document SDH information. In these CHCs, we observed that respondents often found the tools, “cumbersome to use” describing them as “very long checklists that took too long to complete and wouldn't be useful anyway” (Field notes, Clinic 8). Without a consistent way to document SDH information that was perceived to be useful and easy to use, this information was either not documented at all, or put in a note which was difficult to find and act on.

Prioritization

Patients' experienced multiple, concurrent social and economic risks, and these risks changed over time (e.g., patient may have a job or home one month, but lose it the next). And, how patients prioritized those needs (and what they wanted help with or not) varied and changed over time, too. Identifying social risk and then helping clinical team members work with patients to prioritize these risks was an unmet information need. As this quote below shows, this included those CHCs that had checklist-based screening tools in their EHRs, as they were not directly linked to a specific visit:

So, screening scores [for social risk] will always be under the flow sheets. But if you want it as part of that visit, along with the progress note to show where they're at, you literally have to bring it into the record. Anybody can look them up. But it just is more steps to take and it may get overlooked (Interview, Clinic 1, MA).

Managing Referrals for Social and Economic Needs

Some CHCs had staff to help patients address priority social risks, and when a face-to-face warm handoff was made to, for instance a coach, social worker or resilience specialist, social risk information was communicated verbally. However, warm handoffs were not always possible, as team members might be busy or working at a different location. In those situations, an internal referral would be made, and – as noted above – the EHR did not have consistent tools to support information sharing. Clinical teams also referred patients to external organizations for assistance with social risks (e.g., public health office). While most clinical teams used Care Everywhere (i.e., Epic program platform that facilitates searching affiliated institutions for patient information) to manage information flow with external medical organizations, no comparable system for making, monitoring and tracking follow-up existed when a recommendation was made for a patient to engage with a community resource. As such, monitoring and tracking referral follow-through usually relied on patient recall at a subsequent patient encounter.

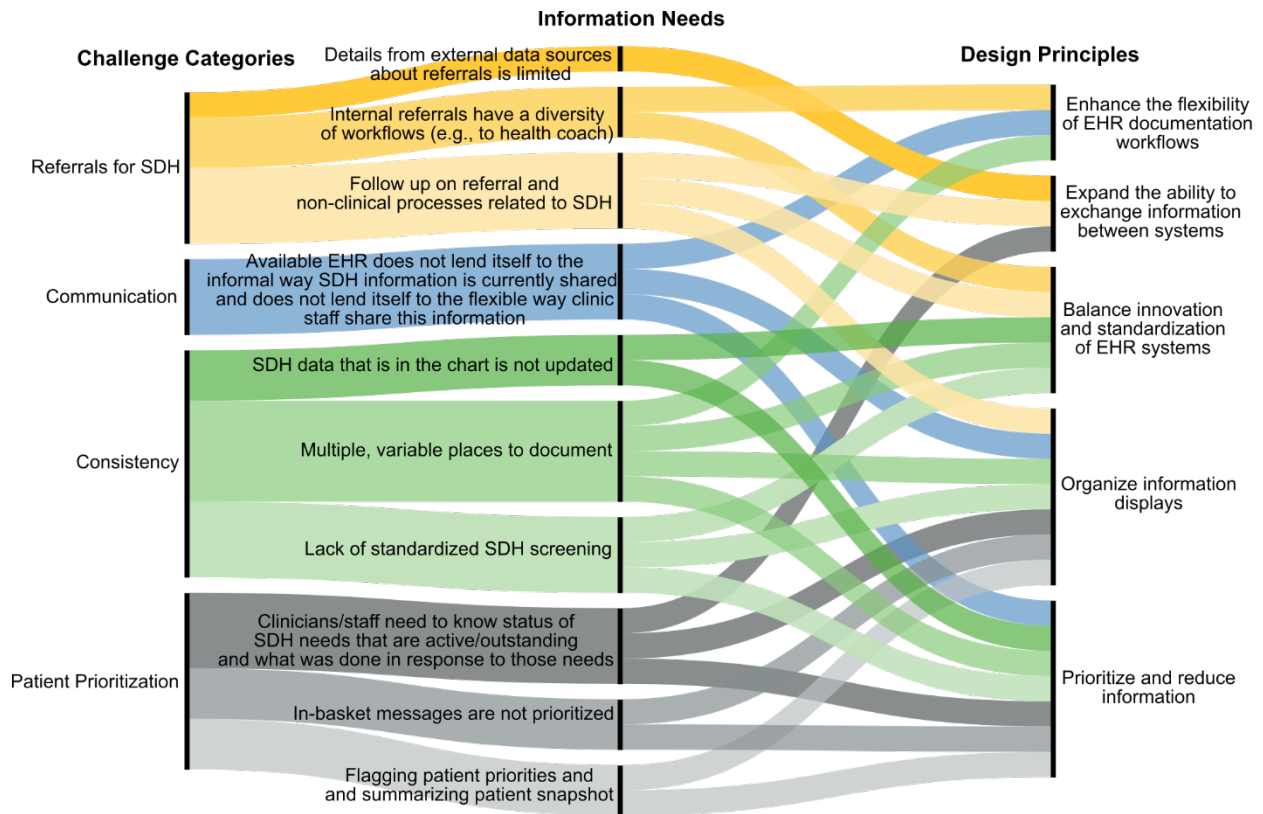
Communication

It is common for multiple team members to engage in a single patient's care. Several aspects of team communication and coordination related to social risk information emerged as challenging for CHCs. Direct communication about SDH information among team members tended to be informal, and did not happen at regularly scheduled times. Information sharing occurred between clinicians and MAs during huddles to prepare for the day's patients, between team members just prior to a patient encounter, and less regularly between a clinician and a non-MA team member in a face-to-face conversation. Teams struggled to communicate social risk information when in-person communication was not an option.

Preferences for how to share social risk information within and across clinics were influenced by multiple factors, such as location of the providers and how busy they were. Because users lacked the opportunity to enter social risk information as a discrete data element in the EHR, this information was documented via free text in a patient note, and tended to take time to document and read. Consequently, it was then also difficult for subsequent users to easily find, even if they were looking for it (see quote above). Work-arounds observed related to communication of social risk information included bolding sections of notes and overlaying handwritten notes onto printed face sheets.

Identify Design Principles (Aim 3)

The unmet information needs enumerated above require that the EHR functions have more flexibility than what is currently offered (e.g., a checklist or template) to support documentation and use of social risk information. Through this work, we have developed five principles to consider when guiding EHR re-design related to social risk information. The figure below visually demonstrates how the four challenge categories link to the unmet information needs, and how, through different paths, these challenges and information needs connect with one or more design principles; there is an almost direct relationship between the challenges and unmet information needs. The table below defines each design principle and shows how they connect to unmet information needs identified through field observation.



Challenge Categories, Information Needs, and Design Principles

Design Principle Definitions and Illustrative quotes

Design Principle	Design Principle Definition	Illustrative Quote
Enhance the flexibility of HIT documentation workflows	HIT documentation for SDH by different roles requires flexibility due to their variable workflows; design must find ways to integrate the SDH-specific component into different workflows and at different times.	The Health resiliency specialist wishes there was an easy way for providers to communicate directly to her and the BHC in the chart about social needs (i.e. 'patient is getting evicted, needs help with housing') but fragmented support system makes this difficult as providers have to refer to different people depending on insurance which adds a level of complexity. - Scrum Debrief Summary, Clinic 4
Expand the ability to exchange information between systems	Health Information Exchange (or HIE) facilitates the exchange of information between different systems for patients receiving support and care at different sites; although this has historically focused on different health systems, information exchange between health teams and government agencies and community-based organizations may be important to expand.	If it's a formal referral that was handled by the provider here, our referrals department will somewhat track it. There will be a paper trail right up to the point where the external office that we referred to was meant to now call the patient. But, they don't track it any further...If it's the community services such as the food bank and so forth, you have to think to ask. That's all there is. There's no formal tracking at this facility of where and how patients are needing and accessing the voluntary sector in the community and with regards to behavioral health, as recently mentioned, this picture is abysmal and the only way to do it is to take responsibility for yourself and make it happen. - Interview, NP, Clinic 6
Balance innovation and standardization of HIT systems	HIT systems are already in place for the clinics, and innovation needs to be tempered with the fact that there is a constant push to standardize to create more consistency. Every innovation needs to be carefully considered for what it will affect, and how it can fit into the standards that exist.	This wellness coach was working at a practice that was piloting a SDH screening tool. When queried on the tool, the respondent notes that she has an existing resource tool that she uses for this, and that the new tool, which is a type of flowsheet, is not as helpful as the original one she is using. Interviewer 2: Are you guys using that at all? Respondent: I am not using it as much because I did and I didn't find it as helpful as going to my resources and just, well, it wasn't being printed out for one thing on there, after-visit summary, so I would have to go look it up anyway and get a print out so that's generally what I do. - Interview, Wellness Coach, Clinic 9
Organize information displays	People requested simple, easy to read views – a straightforward visual grammar – that made it easy to see what was an issue, what was addressed, and what may be next.	There's all kinds of stuff buried within the upper left-hand Epic click-down. Even just simply the references. Even getting into some of the training modules and other things. You've got to have the time, you've got to have the need to do it, but when it's so few and far between, what guides you to go there for that information? What directs you to actually do that? - Interview, RN Care Coordinator, Clinic 5
Prioritize and reduce information	People felt overwhelmed by the amount of information available, and wanted ways to prioritize the information so they could focus their limited attention on what matters most.	"I think those barriers have to be up towards the top where they're seen so that people can understand. I mean we have people that said they can't make the appointment because I'm betting they didn't get child care for blah, blah, blah. I think that those would be very helpful to at least be able to identify some real specific things. If I develop a plan that requires them to do something but it's out of their purview, if I have in front of me, I know that's an option for me so let's cut through that one, we don't need to mess with it. You know what I'm saying?" – Interview, MA, Clinic 2

Prototype Development and User Testing Results

To address unmet information needs unearthed in CLINCH-IT, user-centered design was completed to build a dashboard that prioritized and summarized social determinants of health for review by clinical team members. The prototype dashboard that was built incorporated factors such as clinician priority, patient readiness, and referral status, with the screening functionality being based off the core measures of the PRAPARE screening tool. We used the System Usability Scale (SUS) to measure usability in a testing and task tracking protocols, and semi-structured interviews to gather feedback on and refine the prototype. The testing protocol captured the user's current workflow and involvement in documenting, tracking, and addressing SDH needs and guided the user through a variety of clinical tasks that could be completed using the functionalities of the prototype dashboard. Task areas included documenting social needs, identifying unaddressed needs based on a pre-populated patient dashboard, determining referral status, adjudication of clinical priorities, and reviewing a patient's historical social needs.



Results are shown in the table below; an SUS score of 73 in phase 2 of the prototype dashboard outperforms 100% of the predominant EHRs with regard to usability. Best individual scores included: "This tool would effectively support the management of SDH needs in my patients.", average 5.67 (out of 7); "I would imagine that most people would learn to use this system very quickly.", average 5.83; and "I thought the system was easy to use.", 5.50.



System Usability Scale (SUS)

	Phase 1 (N=8)	Phase 2 (N=15)
System Usability Scale Score (0-100)	68	73

Several changes were made as a result of the first and second round based on the semi-structured interviews. Prioritization defaults were changed from exclamation points to explanatory text on what in the response led to the priority; and a single 'priority' column was split into clinician priority and patient readiness, with additional information about the status of referrals for needs. For summarization, additional requests were made for role-specific information to be highlighted. Recency and history of the patient-generated SDH status were requested, and were made more visible in the subsequent displays. Workflow was felt to be improved over the current state universally. Additional feedback included: automatic sorting of high priority domains, a table or graphical display of historical responses, an expanded referral status column with more detailed information, adding a user name under the last reviewed date, adding a date to the referred column, and making the dashboard more visually appealing by incorporating more color.

Figure 1. Initial revision of prototype

	Domain	Last Reviewed	Clinician Priority	Patient Readiness	Referred	Referral Complete	
Filter By:	<input type="text" value="Domain"/>	<input type="text" value="Last Reviewed"/>	<input type="text" value="Clinician Priority"/>	<input type="text" value="Patient Readiness"/>			
>	 Food Insecurity	2019-01-07	Medium	Ready	Y	N	

	Domain	Last Reviewed	Clinician Priority	Patient Readiness	Referred	Referral Complete	
Filter By:	<input type="text" value="Domain"/>	<input type="text" value="Last Reviewed"/>	<input type="text" value="Clinician Priority"/>	<input type="text" value="Patient Readiness"/>			
>	 Food Insecurity	2019-01-07	Medium	Ready	Y	N	

Conclusion

There is a growing recognition for the need for EHR redesign to better support clinical decision-making related to social risk information. Despite this recognition, the adoption of EHR-based SDH data collection has been gradual. Adoption of SDH data collection in primary care may be impacted by barriers similar to those that have slowed the uptake of other types of patient-reported measures. Vendors are beginning to recognize the gap in current EHR systems and are moving to close it. Our study results emphasize the need to understand the unique needs of CHC clinics, the primary providers of healthcare to population groups with a high degree of medical, social, and economic complexity. The design principles identified can guide the development of EHR systems that address the needs of clinical teams in CHCs.

LIST OF PUBLICATIONS AND PRODUCTS

Publications

Erika K. Cottrell, Rachel Gold, Sonja Likumahuwa, Heather Angier, Nathalie Huguet, Deborah J. Cohen, Khaya D. Clark, Laura M. Gottlieb, Jennifer E. DeVoe. Using health information technology to integrate social determinants of health into primary care: A conceptual framework to guide research. *J Health Care Poor Underserved*. 2018; 29(3): 949–963. doi: 10.1353/hpu.2018.0071

Kate LaForge, Rachel Gold, Erika Cottrell, Arwen E. Bunce, Michelle Proser, Celine Hollombe, Katie Dambrun, Deborah J. Cohen, Khaya D. Clark. How 6 Organizations Developed Tools and Processes for Social Determinants of Health Screening in Primary Care. *J Ambul Care Manage*. 2018 Jan; 41(1): 2–14. doi: 10.1097/JAC.0000000000000221

Cohen DJ, Wyte-Lake T, Dorr, DA, Gold R, Holden RJ, Koopman, RJ, Colasurdo J, Warren N. Unmet information needs of clinical teams delivering care to complex patients and design strategies to address those needs. *J Am Med Inform Assoc*. 2020 May; 27(5): 690-699. doi: <https://doi.org/10.1093/jamia/ocaa010>.

Other Products

National Conferences

Clark KD, Keller S, Gold R, Holden R, Koopman R, Dorr D, Melgar G, Cameron D, Chase D, Dambrun K, Muller B, Gunn R, Sachdeva B, Cohen DJ. Preliminary Findings on Community Health Centers' Clinical Information and Health IT Needs When Addressing Patients' Social Determinants of Health. Presentation at 44th Annual North American Primary Care Research Group Meeting, Colorado Springs, CO, November 2016.

Clark K, Keller S, Gold R, Holden R, Koopman R, Dorr D, Melgar G, Cameron D, Chase D, Dambrun K, Muller B, Gunn R, Sachdeva B, Cohen D. Community Health Centers' Health IT Needs When Addressing Social Determinants of Health and Caring for Complex Patients. Presentation at 44th Annual North American Primary Care Research Group Meeting, Colorado Springs, CO, November 2016.

Clark, KD, Dorr, DA, Cholan, R, Gold, R, Holden, R, Koopman, R, Sachdeva, B, Cohen, DJ. Health information technology needs of community health center care teams: Complex patients and social determinants of health information. Presented at the American Medical Informatics Association Annual Meeting, 2018, San Francisco.

Cohen, DJ, Dorr, D., Gold, R, Holden, R., Koopman, R, Wyte-Lake, T, Cholan, R, Sachdeva, B. "Health Information Technology Needs of Community Health Center Care Teams: Complex Patients and Social Determinants of Health Information," Presented by Deborah Cohen, Ph.D., of OHSU Family Medicine and DMICE. November 5th 2018.

Colasurdo J, Pizzimenti C, Dorr D, Wyte-Lake T, Holden R, Gold R, Koopman R, **Cohen DJ**. Meeting health information technology needs in the management of social determinants of health. Presented at the Dissemination & Implementation Conference. Washington, DC. December 2019

Clark, KD, Dorr, DA, Cholan, R, Gold, R, Holden, R, Koopman, R, Sachdeva, B, Cohen, DJ. Health information technology needs of community health center care teams: Complex patients and social determinants of health information. Presented at the American Medical Informatics Association Annual Meeting, 2018, San Francisco.

Clinical Learning Collaboratives

4/17/19: SDH research at OCHIN – Gold, Cottrell, Hendricks, Cohen

6/25/19: Research on SDH at OCHIN: Past, Present, Future – Gold and Cohen

Dissemination into Clinical Practice

In addition, our collaboration with OCHIN has led to changes to their SDH tool. These changes have been updated in the OCHIN EPIC EHR system, which means that our study informed the SDH tools in an EHR system that is used by over 500 community health centers nationwide, and provides care for over 18 million patients.